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10/663,561	09/15/2003	Nancy D. Denslow	5853-238	3958

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Akerman Senterfitt  
Suite 400  
222 Lakeview Avenue  
West Palm Beach, FL 33402-3188

EXAMINER
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SALMON, KATHERINE D

ART UNIT	PAPER NUMBER
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1634

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/19/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/663,561	<b>Applicant(s)</b> DENSLOW ET AL.	
	<b>Examiner</b> Katherine Salmon	<b>Art Unit</b> 1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) 33-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. This action is in response to papers filed 1/05/2007. Currently Claims 1-39 are pending.
2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/05/2007 has been entered.
3. Claims 33-39 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claims.
4. This action for Claims 1-32 contains reiterated rejections and rejection necessitated by amendment. Response to arguments follows.

**Maintained Rejections and Rejections Necessitated by Amendment**

***Priority***

5. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. [1] as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Application No. 60/410,414, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. Claims 1-32 are drawn to a method for detecting comprised of analyzing specifically identified SEQ IDs. These genes or gene fragments are not listed in Application No. 60/410,414. Accordingly Claims 1-32 are not entitled to the benefit of the prior application.

**Response to Argument**

The reply filed 1/05/2007 did not provide any argument to the denial of benefit of Claims 1-32 to Application No. 60/410,414. The filing date of the instant application therefore is 09/15/2003.

***Claim Objections***

6. Claims 1-32 are objected to because they specifically recite nonelected subject matter. The Claims require "at least one gene, or homologs thereof, encoded by a nucleotide sequences, selected from the group consisting of SEQ ID NO's: 146, 148, 149, 166, 167, 178, 194, 199, 200, 207, 285, 347, 424, 489, 505, 509, 516, 519, 532-534, 542, 545, 551, 529 for identifying estrogen activity and SEQ ID NO's 14, 15, 25, 28, 30, 42, 44, 47, 52, 61, 62, 71, 558, and 555". As stated in the response to the restriction filed 12/25/2005, applicant has elected a specific combination of SEQ ID NO's: 146, 148, 149, 166, 167, 178, 194, 199, 200, 207, 285, 347, 424, 489, 505, 509, 516, 519, 532-534, 542, 545, 551, 529 for identifying estrogen activity and SEQ ID NO's 14, 15, 25, 28, 30, 42, 44, 47, 52, 61, 62, 71, 558, and 555. Applicant should amend the claims so that the claims are directed to the elected invention of the specific combination of genes.

Prior to allowance of these claims, the non-elected subject matter will be required to be deleted from the claims.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claims 1-32 are unclear. The claims are drawn to gene or homologs encoded by a nucleotide sequence selected from the group of SEQ ID Nos. It is unclear if each gene is represented by one SEQ ID or if each gene is represented by more than one SEQ ID. In the reply for restriction (12/22/2006) applicant elected the specific set of SEQ IDs listed in the instant claims. Therefore it is unclear if the expression of at least one gene would reflect the expression of all the elected SEQ ID Nos.

***Claim Rejections - 35 USC § 112-Scope of Enablement***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1-7 and 10-32 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for:

A method of detecting the presence of an agent having estrogenic or androgenic activity in a sample, the method comprising the steps of:

(A) Providing at least one sheephead minnow or large mouth bass fish cell exposed to the sample for detection of the expression of the combination of sequences consisting of SEQ IDs SEQ ID No's SEQ IDs 146, 148, 149, 166, 167, 178, 194, 199, 200, 207, 285, 347, 424, 489, 505, 509, 516, 519, 532-534, 542, 545, 551, and 529 for identifying estrogenic activity and SEQ IDs 14, 15, 25, 28, 30, 42, 44, 47, 52, 61, 62, 71, 558, and 555 for identifying androgenic activity; and

(B) Comparing the expression level of each of SEQ IDs No: 146, 148, 149, 166, 167, 178, 194, 199, 200, 207, 285, 347, 424, 489, 505, 509, 516, 519, 532-534, 542, 545, 551, 529, 14, 15, 25, 28, 30, 42, 44, 47, 52, 61, 62, 71, 558, and 555 in at least one sheephead minnow or large mouth bass fish cell exposed to the sample with a control cell not exposed to the sample, wherein an change in the level of

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expression of SEQ IDs No: 146, 148, 149, 166, 167, 178, 194, 199, 200, 207, 285, 347, 424, 489, 505, 509, 516, 519, 532-534, 542, 545, 551, and 529 in sheephead minnow or large mouth bass fish cell as compared to the level of expression in a control cell indicates that the sample contains an agent which has estrogenic activity and wherein an change in the level of expression of SEQ ID Nos: 14, 15, 25, 28, 30, 42, 44, 47, 52, 61, 62, 71, 558, and 555 in a sheephead minnow or large mouth bass fish cell as compared to the level of expression in a control cell indicates that the sample contains an agent which has androgenic activity.

does not reasonably provide enablement for any type of fish species, or detection of homologs. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims.

Factors to be considered in determining whether a disclosure meets the enablement requirement of 35 USC 112, first paragraph, have been described by the court in *In re Wands*, 8 USPQ2d 1400 (CA FC 1988). *Wands* states at page 1404,

"Factors to be considered in determining whether a disclosure would require undue experimentation have been summarized by the board in *Ex parte Forman*. They include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims."

#### The nature of the invention and breadth of claims

Claims 1-7 are drawn to a method for detecting the presences of an agent having estrogenic or androgenic activity in a sample, comprising providing at least one fish cell exposed to the sample and analyzing for expression of a combination of SEQ IDs by comparing the expression of the cell to a control cell. Claims 8-9 define the cell. Claim 10 defines the fish cell. Claim 11 is drawn to a method comprising isolating RNA

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transcripts. Claim 12 is drawn to expression comprises contacting the isolated RNA transcripts. Claim 13 and 14 are drawn to a method wherein the probe is immobilized on a substrate. Claims 15-20 are drawn to a method wherein the step of analyzing the at least one fish cell for expression of a combination of genes further comprises contacting the isolated RNA transcripts or nucleic acids derived with different probes that each hybridize to a different nucleotide sequence selected from a combination of genes. Claim 21 and 22 are drawn to a method wherein the at least one probe or the isolated RNA transcripts or nucleic acids are conjugated with a detectable label. Claim 23 is drawn to a method comprising analyzing the control cell not exposed to the sample having estrogenic or androgenic activity for expression of a combination of genes. Claim 24-27 are drawn to a method comprising analyzing the control cell not exposed to the sample having estrogenic or androgenic activity for expression of probes of a combination of genes and isolating RNA transcripts wherein the fish cell has a detectable label and the RNA transcripts have a second detectable label. Claim 28 is drawn to a method of comparing the expression of the at least one nucleic acid in the cell with the expression of the control cell. Claim 29 is drawn to a method comprising contacting the at least one fish cell with a sample prior to analyzing the expression level. Claim 30 is drawn to a method wherein the sample comprises water. Claim 31 is drawn to a method comprising providing a fish and contacting the fish with the sample. Claim 32 is drawn to a method for determining if an agent has estrogenic, anti-estrogenic, androgenic, or anti-androgenic activity comprising contacting at least one fish cell with an agent and analyzing the expression level of a combination of genes.

The invention is in a class of invention which the CAFC has characterized as "the unpredictable arts such as chemistry and biology." *Mycogen Plant Sci., Inc. v. Monsanto Co.*, 243 F.3d 1316, 1330 (Fed. Cir. 2001).

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The unpredictability of the art and the state of the prior art

The art is silent with regard to expression analysis of corresponding genes in other fish species.

Guidance in the Specification and working examples

The specification teaches nucleic acid sequences from only the sheepshead minnow and largemouth bass. The specification teaches that sheepshead minnow and largemouth bass genes are unregulated or down regulated in tissues that have been exposed to an estrogenic or androgenic agent (p. 2 lines 9-11). The specification is silent with regard to these genes in other fish species. The specification provides 560 sequences for use on the array; each sequence is from either the sheepshead minnow or largemouth bass. The specification does not show the correlative sequences between sheepshead minnow and largemouth bass. For example, SEQ ID 14 is derived from a gene from sheepshead minnow, but the specification does not provide correlative information for the same region in the largemouth bass species. The specification does not show what the correlative sequence would be correlative sequence would be in other fish species, such as shark or salmon.

The claims of the instant application are drawn to a whole gene or a part of a gene; however the specification does not teach which portions of these sequences would need to be examined to provide informative expression analysis for the detection of estrogenic or androgenic compounds. It is unclear from the absence of evidence what part of the genes in each fish species provides correlative expression levels differences between a control and a cell acted on by an androgenic or estrogenic agent.

The examples provided by the specification teach arrays for expression profiling. The first example teaches the expression profiling of estrogenic compounds using mRNA from a sheepshead minnow (p. 26 lines 21-22). The specification also teaches a largemouth bass array to monitor exposure of fish to xenoestrogens (p. 31, lines 20-22).

Of the 560 sequences presented by the applicant in regards to expression of estrogenic or androgenic agents all were sheepshead minor or largemouth bass (p. 9 lines 23-24). The specification does not teach if these genes are observed in other species of fish and whether these genes provide the same expression in those species.

The claims are drawn to homologs of genes encoded by the elected sequences. The term "homolog" has not been defined in the specification. Homolog is a relationship between two sequences based on structure. However, even if two sequences have a high homology does not necessary mean that the function of the two sequences are equivalent. Further it is unclear if homologs would comprise the elected Seq id nos. Therefore, it is unpredictable that any homolog would comprise the elected Seq id nos or have the same functional effect as the elected SEQ ID Nos.

#### Quantity of Experimentation

The quantity of experimentation in this area is extremely large since there is significant number of parameters which would have to be studied the skilled artisan would have to test each species of fish individually to determine if a cell from a specific species would provide adequate expression data to detect androgenic or estrogenic compounds. The skilled artisan would have to determine the sequence of each species of fish of a particular gene determine if it comprised the equivalent elected sequence and then determine if that sequence had the same function effect of expressing estrogenic or androgenic activity.

This would require a large amount of inventive effort, with each of the many intervening steps, upon effective reduction to practice, not providing any guarantee of success in the succeeding steps.

#### Level of Skill in the Art

The level of skill in the art is deemed to be high.

#### Conclusion

In the instant case, as discussed above, in a highly unpredictable art where the sequences of two species of fish are provided but there is no support in the art or the specification that those genes or homologs are present or would provide the same expression values (function) in other species of fish. Given the broad claims in an art whose nature is identifies as unpredictable, the unpredictability of that art, the large quantity of research required to define these unpredictable variables, the lack of guidance provided in the specification balanced only against the high skill level in the art, it is the position of the examiner that it would require undue experimentation for one of skill in the art to perform the method of the claim as broadly written.

#### **Response to Arguments**

The response traverses the rejection. The response asserts that homologs of the genes of the instant specification can be identified in other species (p. 11 last paragraph). The reply asserts Exhibit A describes how one would find homologs starting with the genes sequences for largemouth bass and Sheepshead minnow (p. 11 last paragraph and p.12 1op paragraph). The reply asserts that the Declaration points out that "the entire sequence or any part of the sequence (at least 30 nucleotides in

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length) that is unique to the gene (or homolog) would provide correlative expression levels between control and exposed cells.” (p. 12 2<sup>nd</sup> full paragraph). The reply asserts that unique segments for genes can be determined by testing any segment via BLASTN (p. 12 2<sup>nd</sup> full paragraph). The reply asserts a few segments may be specific for gene families rather than the specific gene mentioned and these segments would have lower correlative value and then a sequence containing only this domain would not distinguish for instance estrogen receptors but would give an average value for their expression (p. 12 2<sup>nd</sup> full paragraph). The reply asserts that the term “homolog” corrects the enablement issues presented for the phrase “wholly or partially encoded” (p. 12 last paragraph).

These arguments have been thoroughly reviewed but have not been found persuasive.

The declaration under 37 CFR 1.132 filed 6/08/2006 is insufficient to overcome the rejection of claims 1-7 and 10-32 based upon insufficient disclosure under 35 U.S.C. 112, 1<sup>st</sup> paragraph scope of enablement as set forth in the last Office action because: In view of the foregoing, when all of the evidence is considered, the evidence is not persuasive because the declaration does not establish that a representative number of the claimed homologs will have the same estrogenic or androgenic activity in other types of fish. As presented below, the specification and the 37 CFR 1.1232 filed 6/08/2006 have not provided guidance as to how any correlate any homologous structure with the function of estrogenic or androgenic activity.

The declaration has not provided sufficient evidence that a homolog would produce the same functionality as the elected sequences. The term “homology” in the amended claim is not sufficient to remove the unpredictability in the encompassed invention. Though, the skilled artisan would be able using the NCBI website to

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determine homologous sequences of the elected SEQ ID Nos, it is unpredictable that these homologous sequences would produce the same functional effect as the elected SEQ ID Nos in the two specific gene species.

Though, the applicant has provided three species within the genus of fish (two in the instant specification and 1 in the declaration), these three species do not describe all variants found in the genus of fish. The reply asserts that for estrogen and androgen receptors various fish homology can extend **up** to 90% (132 Declaration p. 3 point 7). Though, the examiner is not disputing that **some** fish can have sequence homology, however, the claims are drawn to ANY fish cell. The search of the SEQ IDs claimed indicates homology is not identical among species of fish. Therefore it is unclear how much homology must be present between two sequences to produce the same functionality.

For example, SEQ ID No. 166 does not have complete homology with *Ictalurus punctatus* estrogen receptor alpha antisense RNA (channel catfish) (GenBank Accession AF253507). For the nucleotides in which there is homology it is less than 90% (nucleotides 1072-1479 of the instant SEQ ID No. 166 has 82% homology with nucleotides 5780-5373; nucleotides 625-867 of the instant SEQ ID No. 166 has 82% homology with nucleotides 6230-5988; nucleotides 1561-1730 of the instant SEQ ID No. 166 has 84% homology with nucleotides 5291-5122). Therefore it is unclear if any of these homologous sequences would have the same expression level changes for estrogenic or androgenic activity, which is observed using the elected sequences. It would require undue experimentation on the part of the skilled artisan to determine which homologous sequences would produce the same functional effect as the elected sequences.

Further, sequence homology is of vital importance and therefore ANY homologous sequence would not product the same functional effect. The declaration states that even if a scientist knew the name of a gene (vitellogenin) that is a biomarker for estradiol, if the scientist used the wrong probe sequence within the vitellogenin gene to make a gene chip, there is a high probability that no positive response would be observed on the chips when the chip is hybridized with tissue extracted from tissue/cells obtained from animals exposed to estrogens or compounds that mimic estrogens (p. 4-5 of 132 declaration point 9). Therefore, homology is an important factor for the claimed invention. It is unpredictable to use any sequence, which is homologous to the elected sequences because as stated in the 132 declaration the wrong probe sequence within a gene would show no correlation to estrogen receptors.

***Claim Rejections - 35 USC § 112-Written Description***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1-7 and 10-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors at the time the application was filed had possession of the claimed invention.

Claims 1-7 are drawn to a method for detecting the presences of an agent having estrogenic or androgenic activity in a sample, comprising providing at least one fish cell exposed to the sample and analyzing for expression of a combination of SEQ IDs by comparing the expression of the cell to a control cell. Claim 10 is drawn to a method wherein at least one fish cell was obtained from a fish that had been exposed to the sample. Claim 11 is drawn to a method wherein the step of analyzing the fish cell for expression of a combination of genes comprises isolating RNA transcripts from at least one cell. Claim 12 is drawn to expression of a combination of genes further comprises contacting the isolated RNA transcripts or nucleic acids derived therefrom with at least one probe that hybridizes to at least one nucleotide sequence from the group of SEQ IDs. Claim 13 and 14 are drawn to a method wherein the probe is immobilized on a substrate comprised nylon, nitrocellulose, glass, and plastic. Claims 15-20 are drawn to a method wherein the step of analyzing the at least one fish cell for expression of a combination of genes further comprises contacting the isolated RNA transcripts or nucleic acids derived with different probes that each hybridize to a different nucleotide sequence selected from a combination of genes. Claim 21 and 22 are drawn to a method wherein the at least one probe or the isolated RNA transcripts or nucleic acids are conjugated with a detectable label. Claim 23 is drawn to a method comprising analyzing the control cell not exposed to the sample having estrogenic or androgenic activity for expression of a combination of genes. Claim 24-27 are drawn to a method comprising analyzing the control cell not exposed to the sample having estrogenic or androgenic activity for expression of probes of a combination of genes and isolating RNA transcripts wherein the fish cell has a detectable label and the RNA transcripts have a second detectable label. Claim 28 is drawn to a method of comparing the expression of the at least one nucleic acid in the cell with the expression of the control

cell. Claim 29 is drawn to a method comprising contacting the at least one fish cell with a sample prior to analyzing the expression level. Claim 30 is drawn to a method wherein the sample comprises water. Claim 31 is drawn to a method comprising providing a fish and contacting the fish with the sample. Claim 32 is drawn to a method for determining if an agent has estrogenic, anti-estrogenic, androgenic, or anti-androgenic activity comprising contacting at least one fish cell with an agent and analyzing the expression level of a combination of genes.

The specification teaches sequences of only the sheepshead minnow and largemouth bass. The specification teaches specific genes from sheepshead minnow and specific genes from largemouth bass that are unregulated or down regulated in tissues that have been exposed to an estrogenic or androgenic agent (p. 2 lines 9-11). The specification is silent with regard to the identity of analogous genes within the two species presented. For example, Sequence 30 is a fragment of the LDL receptor in largemouth bass, the specification does not teach an analogous gene in the sheepshead minnow. The specification is silent with regard to the identity of analogous genes in other species of fish, such as shark or flounder.

The claims of the instant application are drawn to functional expression analysis, which provides information regarding the detection of estrogenic or androgenic agents. However, the specification does not teach the structural requirements of analogous sequences in other fish species that would provide the same functional expression analysis. The specification does not teach what portions of the claimed sequences would provide for the same functional expression analysis in other fish. Due to the absence of guidance in the specification, it is unclear what part of the genes are needed by each fish species to have function in the fish and thereby provide expression levels differences between an control and a cell acted on by a androgenic or estrogenic agent.

The examples provided by the specification teach arrays for expression profiling. The first example teaches the expression profiling of estrogenic compounds using mRNA from a sheepshead minnow (p. 26 lines 21-22). The specification also teaches a largemouth bass array to monitor exposure of fish to xenoestrogens (p. 31, lines 20-22).

Of the 560 sequences presented by the applicant in regards to expression of estrogenic or androgenic agents all were sheepshead minor or largemouth bass (p. 9 lines 23-24). The specification does not teach if these genes are observed in other species of fish and whether these genes provide the same expression in those species.

The claims encompass "homologs" to the elected sequences. It is unclear what percent identity a sequence needs to have in order to be classified as a "homolog". Further, even if two sequences share homology, there is no support in the specification that these homologous sequences would have the same functional effect as the elected Seq ids. Therefore the claims encompass sequences with unknown percent identity to the elected SEQ IDs and which the instant specification does not provide correlative functionality.

The genus of the claimed invention encompasses substantial variability in the nucleic acid sequences from the different species of fish. The specification fails to provide description or guidance as to which portions of the sequences claimed from the sheepshead minnow and the largemouth bass would be functionally similar in an array for detection in other fish species, such as, salmon or shark. The specification fails to sufficiently describe the claimed invention in clear and exact terms so that a skilled artisan would recognized that the applicants were in possession of the claimed invention at the time of filing.

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Vas-Cath Inc. v. Mahurkar, 19 USPQ2d 1111, makes clear that "applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention." (See page 1117). The specification does not "clearly allow persons of ordinary skill in the art to recognize that [he or she] invented what is claimed." (See page 1116).

Finally, University of California v. Eli Lilly and Co., 43 USPQ2d 1398, 1404, 1405 held that:

...To fulfill the written description requirement, a patent specification must describe an invention and do so in sufficient detail that one skilled in the art can clearly conclude, "the inventor invented the claimed invention." *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (1997); *In re Gosteli*, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989) (" [T]he description must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed."). Thus, an applicant complies with the written description requirement "by describing the invention, with all its claimed limitations, not that which makes it obvious," and by using "such descriptive means as words, structures, figures, diagrams, formulas, etc., that set forth the claimed invention." *Lockwood*, 107 F.3d at 1572, 41 USPQ2d at 1966.

An adequate written description of a DNA, such as the cDNA of the recombinant plasmids and microorganisms of the '525 patent, "requires a precise definition, such as by structure, formula, chemical name, or physical properties," not a mere wish or plan for obtaining the claimed chemical invention. *Fiers v. Revel*, 984 F.2d 1164, 1171, 25 USPQ2d 1601, 1606 (Fed. Cir. 1993). Accordingly, "an adequate written description of a DNA requires more than a mere statement that it is part of the invention and reference to a potential method for isolating it; what is required is a description of the DNA itself." *Id.* at 1170, 25 USPQ2d at 1606.

The sequences of the 2 species of fish disclosed (sheepshead minnow and largemouth bass) disclosed is not representative of the genus of nucleic acid sequences because the genus is highly diverse. The specification has not taught which portions or what sequences would provide correlative expression in other species of fish, such as shark or salmon. Applicant is reminded that Vas-Cath makes clear that the written

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description provision of 35 USC 112 is severable from its enablement provision (see page 1115).

### **Response to Arguments**

The response traverses the rejection. The reply asserts that homology does not need to be identical among species of fish species and that one can identify genes in other species using the BLASTP program (p. 13 last paragraph). The reply asserts that homology does not need to be greater than 90% because genes found to be homologs share high homology in blocks of sequences that are highly conserved and may have low homology in regions, which are of less importance (p. 14 last paragraph). The reply asserts that one should be able to identify the homologs and design specific oligonucleotides based on the sequence of the homologs to test the species of interest (p. 13 last paragraph). The reply asserts the SEQ ID Nos disclosed are selected to identify genes and therefore homologs in any fish species can be identified using the known sequence of the genes in the instant specification.

These arguments have been thoroughly considered but have not been found persuasive.

The instant specification does not provide support the how structurally similar to sequences must be in order to be considered homologs. Though, the skilled artisan would be able to compare sequences between species and determine the sequence identity between the two, it is unpredictable which portions of the gene sequence must be identical in order to determine if two sequences are homologs. Further, even if the two sequences share a particular percent identity, the sequences may not have the same functional effect. Even though two sequences may be homologous they do not necessary have the same functional effect. The 132

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declaration filed 6/08/2005 indicates that from the same gene different sequences indicate a different correlation to estrogen and androgenic levels, therefore, changes in the structure even if the overall structure is homologous, has functional effects. The 132 states that even if a scientist knew the name of a gene (vitellogenin) that is a biomarker for estradiol, if the scientist used the wrong probe sequence within the vitellogenin gene to make a gene chip, there is a high probability that no positive response would be observed on the chips when the chip is hybridized with tissue extracted from tissue/cells obtained from animals exposed to estrogens or compounds that mimic estrogens (p. 4-5 of 132 declaration point 9). Therefore, identifying which genes would be up or down regulated in a particular fish does not describe the up or down regulation of any part of the gene in ANY fish. As stated in the declaration, fragments of genes would have different observed expression therefore homologs which have different percent sequence identity with the elected sequences would have different correlative associations with estrogen and androgenic expression.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-7, 9-24, and 30-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Larkin et al. (Marine Environmental Research 2002 (available online May 24, 2002) Volume 54 p. 395).

With regard to Claims 1-7, 9, and 32, Larkin et al. teaches a sheephead minnow estrogen responsive microarray of fragments of cDNA of endocrine disrupting nucleic acids (p. 396 1<sup>st</sup> two paragraphs). Larkin et al. teaches a method of determining estrogenic expression using the expression profile comparison of gene transcripts up regulated or down regulated in a control and exposed group (p. 396 last paragraph and p. 397 1<sup>st</sup> paragraph). Larkin et al. does not specifically teach the exact whole gene sequence of the instant specification, but the claims can be broadly drawn to analyzing fish cell expression of "homologs" of the elected SEQ IDs. Broadly interpreted the claims can be drawn to ANY array of sequences drawn from genes responsive to estrogenic agents because these sequences would be considered "homologs" of the elected sequences.

With regard to Claim 10, 29, 30, and 31, Larkin et al. teaches sheephead minnows exposed to an aqueous solution of  $\beta$ -estradiol (p. 396 1<sup>st</sup> full paragraph). With regard to Claims 11-12 and 15-20, Larkin et al. teaches RNA samples from the adult male sheephead minnow were spotted onto an array and hybridized to probes (p. 396 last paragraph). With regard to Claim 13, Larkin et al. teaches cDNA probes were hybridized to a blot (p. 396 2<sup>nd</sup> full paragraph). With regard to Claim 14, Larkin et al. teaches using a nylon membrane as an array (p. 396 1<sup>st</sup> full paragraph).

With regard to Claim 21, Larkin et al. teaches labeling cDNA probes  $^{33}\text{P}$  dATP (p. 396 2<sup>nd</sup> full paragraph). With regard to Claim 22, Larkin et al. teaches the RNA transcripts were radiolabeled and hybridized (p. 396 last paragraph).

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With regard to Claims 23 and 24, Larkin et al. teaches using radiolabeled RNA from both a treated fish and a control (p. 396 last paragraph and p. 397 1<sup>st</sup> paragraph).

### **Response to Arguments**

The response traverses the rejection. Though the response does not present a specific argument for the traversal of the rejection, the applicant indicates that the art should be removed because of the amendment to the claims to incorporate the term "homolog" and deletion of the phrase "wholly or partially encoded".

This has been thoroughly reviewed but has not been found persuasive.

The claims are drawn to expression of at least one gene or homolog by the nucleotide sequence selected from the group of SEQ IDs. The specification does not teach a concise definition of "homolog". The courts have stated that claims must be given their broadest reasonable interpretation consistent with the specification *in re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997); *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969); and *in re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (see MPEP 2111). The claims are given the broadest reasonable interpretation consistent with the indefinite claim language and specification wherein the "homolog" can be interpreted broadly as any nucleotide sequence that has any share structure with the elected SEQ IDs. Therefore, the claims can be drawn to ANY array of sequences drawn from genes responsive to estrogenic agents.

### **Conclusion**

11. No claims are allowed.

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine Salmon whose telephone number is (571) 272-3316. The examiner can normally be reached on Monday-Friday 8AM-430PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Katherine Salmon  
Examiner  
Art Unit 1634



CARLA J. MYERS  
PRIMARY EXAMINER